The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Ventilation in Chemical Works

THE problem of safety in industry is always prominently before works managers and others who have charge of process plants. Most human beings have moments of carelessness in which their judgment fails to warn them of danger and accidents result. When to this general failing is added lack of knowledge of the risks involved, particularly with such insidious gases as carbon monoxide and nitrous fumes, and in more or less unusual circumstances, the dangers run may be very considerable. For this reason workmen must be looked after by the technical staff, and all possible opportunities for accidents must be removed. To this general feature of industrial work two additional adverse factors have now been added on account of the war. Firstly, there will soon be introduced into industry a considerable proportion of unskilled labour comprising people of both sexes who have not hitherto been used to work in factories. The dangers due to ignorance, and to some extent to carelessness, will thus be increased. Secondly, from the start of the war it has been obligatory on everybody to avoid showing lights during the hours of black-out and this has raised problems of illumination and ventilation that have not always been successfully solved.

In works where chemicals are handled the usual safety regulations for machinery and other normal industrial plant apply and will, of course, be carefully watched by the factory inspectors. Provided that there is adequate illumination of machinery and other moving parts, including valves, furnaces, tanks and so forth, the new conditions should not cause any particular difficulty. But to these normal safety considerations must be added this special one of dangers from breathing or coming into physical contact with chemical substances that are not normally met in industries other than those manufacturing or using chemicals. These dangers are frequently not sufficiently recognised even by the regular employees in the chemical industry and there will certainly be added dangers due to the inexperience of the new workers. The dangers of physical contact with dangerous substances can be readily met by dissemination of the necessary cautions during the period of training and, where necessary, by insisting on the use of protective clothing.

The principal danger, however, is likely to arise, and, indeed, in some works has already arisen, from breathing atmospheres contaminated with greater or lesser concentrations of dangerous gases. The sole and sovereign remedy is to prevent these gases from reaching dangerous proportions in the air. This is achieved in the first place by taking care that leaks do not occur in the plant, and in the second place by maintaining adequate ventilation. Everything that has been said here has been no more than a repetition of normally good technical practice. Ventilation, however, falls into a different category because of the difficulties created by blacking-out the premises. This is a matter of extreme importance and the experience of the past winter has emphasised the need for tackling the problem resolutely. It is a measure of the importance of this problem that the Chemical Engineering Group and the Institution of Chemical Engineers devoted their joint March meeting to a paper on this subject by Mr. E. W. Murray, one of H.M. Inspectors of Factories.

Ventilation is a problem that must be tackled by every factory according to its individual lay-out. It may be necessary to use fans, either the suction or the pressure type, though in many instances natural ventilation can be used successfully. There are many devices, some of which were described by Mr. Murray, which enable adequate ventilation to be maintained without allowing the slightest egress of light from the ventilators. Further information upon this subject can be obtained from the Government publication "Factory Ventilation in the Black-out"; there is also a British Standard ventilator light trap, and examples have been described in THE CHEMICAL AGE, for example, on page six of our issue of July 6 last. Inspectors of factories are also fully able to advise upon the problem of ventilators. Even when this has been done, however, there may often be certain spots in a factory where there is little or no ventilation. These places should be diligently sought for by all works managers in the interests of the efficiency of their factories and the health of their employees. Frequently the best solution of the problem is to put it into the hands of a qualified ventilating engineer.

Closely allied to this problem of ventilation is that of comfort during working hours. The employee will do his or her best work when conditions are such that the air is fresh and the temperature adjusted to the type of work in hand. Under some conditions complete air-conditioning will be found a paying proposition but in general the effect aimed for must be to keep the feet and legs warm and the head cool. The air should never become too highly saturated with water and in general in this country adequate ventilation will achieve correct air saturation. The temperature may be as low as 55° F. for heavy work or as high as 69° F. for light work and offices. Evidence is accumulating that this problem of ventilation is of the highest importance for the maintenance of our war effort.

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NOTES AND COMMENTS

T.N.T. Poisoning

HOWEVER many precautions may be taken against occupational diseases in chemical works, there is always the danger of new troubles of the kind rearing their ugly heads when new processes come into operation under new conditions. War conditions might be expected to give rise to such troubles; but it is rather surprising that the first detailed report of the kind should come from a country that is not at war. The Swedish Institute for Public Health, according to a Press Bureau report quoted in the *Manchester Guardian*, is now concerned with new occupational diseases brought about by factors operating under war conditions, or, shall we say, the necessity of preparing a strong defence. These include dermatitis from handling explosives and producer-gas poisoning. In normal circumstances skin-troubles are rarely heard of in connection with explosives manufacture, but, where hurried and improvised conditions obtain, there is apt to be a recrudescence of this trouble, thanks to neglect of personal hygiene and to badly ventilated premises. The common offender is, as is well known, T.N.T., which causes dermatitis by actual contact with the bulk material or, still more readily, with the dust. It is stated that the irritant properties are derived from lower nitro-impurities, such as dinitrotoluene, but fatal cases of poisoning have been attributed also to tetranitromethane. Given the warning, however, it is sufficient to say that cases of T.N.T. poisoning have been reduced to a minimum by careful attention to personal hygiene, factory conditions precluding unnecessary handling of the material, and proper dust-control. A weekly medical inspection and the use of masks, gloves, and frequently laundered overalls for workers in danger of contamination practically eliminates all risk.

Dangerous Gases

THE problem of dealing with gases in chemical works arises directly from the question of adequate ventilation of factories, which is the subject of our leading article this week. Under most conditions of combustion more or less carbon monoxide is produced. It is the poisonous constituent of coal gas and water gas and it is contained in large amounts in producer gas and blast-furnace gas. It is also produced as an exhaust from internal combustion engines and from coke fires; it is to be noted that a coal fire becomes a coke fire when the bright flame has disappeared. Because carbon monoxide is colourless, odourless, and tasteless it is not detected readily, and because its first symptom is loss of power in the legs, escape is often impossible. Probably this gas is responsible for the great majority of the gassing cases both in industry and in domestic life. Nitrous fumes are a good second from the point of view of the number of fatal or serious cases of gassing. These fumes may be formed directly as part of a chemical process or indirectly by the action of nitric acid carelessly spilt on carbonaceous matter or wherever nitrous explosives are incompletely detonated or subjected to slow combustion. At sea their virulence was well illustrated in the last war by the death rolls which followed the sinking of H.M. ships *Russell* and *Britannia*, when a large proportion of those who had been exposed to the fumes of burning cordite succumbed to their effects. The action of nitrous fumes on the lungs is very like that of phosgene; but they are particularly dangerous because they do not produce any marked immediate discomfort, and men may therefore fail to realise the serious danger that may follow their inhalation.

The Effect of Nitrous Fumes

FROM a medical point of view, when nitrous fumes come into contact with the moisture that is always present in the respiratory tract, they form nitric and nitrous acids, producing a local caustic effect, to which is superadded a general systemic action due to absorption of the alkali nitrites formed by the interaction of the acid with alkaline secretions in the presence of oxygen. The difficulty is that even the general medical practitioner may not recognise a case of poisoning as due to nitrous fumes because the initial symptom of coughing is generally transitory and a period of quiescence varying from 2 to 24 hours or more, according to the conditions of exposure, precedes the onset of the acute symptoms, after which the course of a possibly fatal illness may be run in a few hours. The high-pressure conditions at which industry is working are probably causing workmen to take greater risks in handling these dangerous gases, and it cannot be too greatly emphasised that the precautions mentioned in our leading article should be taken by every works manager as an urgent duty and an essential contribution to our war effort.

Antiseptics from the Soil

THE inter-relation of the different branches of chemistry —in this case agricultural chemistry and biochemistry—is shown to advantage in the recent work of R. J. Dubos, a bacteriologist working at the Rockefeller Institute for Medical Research, New York. Trained as an agricultural chemist, Dubos conceived the original idea that the bacteria associated with the decay, in the soil, of plant and animal tissue might be utilised to decompose any unwanted organic material such as pneumonia bacilli. His experiments, which have been graphically described by the scientific correspondent of the *Manchester Guardian*, proved that this was indeed the case, and he was able finally to isolate a definite substance, produced by a definite bacillus, which was the cause of this damaging effect. At first obtained in association with a protein jelly, the substance was eventually isolated in small quantity in crystalline form; it was found to have the approximate formula $C_{74}H_{106}N_{14}O_{14}$, m.p. 230° C., and mol. wt. 1400. From its property of being able to kill all gram-positive bacilli its discoverer has named the substance gramicidin. In fact, pneumonia bacilli will not grow in broth containing one part gramicidin in 10^9. Dubos believes that an analysis of the pecularity here shown by all gram-positive bacilli may lead to the revelation of important facts about the structure of bacilli in general and the mechanism of antiseptic effect, and eventually to the systematisation of the discovery of new drugs as required.

Meat-Packing By-Products

VAST quantities of nitrogenous waste are accumulated in the processing of animal carcasses and have represented a major problem in disposal since the waste products are not

very suitable for use as fertilisers. The surprising discovery has now been made that destructive distillation of mixtures of meat-packing waste and the fatty acids of vegetable oils leads to formation of valuable chemicals in the shape of fatty acid nitriles, pyridine, quinoline, and aliphatic amines. The crude distillates are sometimes usable without further treatment as insecticides and solvents. Vegetable, animal, or fish oils (palm oil, lard, etc.) may be used directly as the source of fatty acids, but the most economical forms are the waste fatty acids such as those obtained in the refining of vegetable oils (cottonseed oil acids are a particularly cheap waste product in the United States). In an example of the application of the process (B.P. 525,866; Armour and Co.), a mixture of equal parts digester tankage (which contains dried blood, skin, and various carcass residues) and fish oil is made into a paste with sand and heated in a still at a suitable temperature. The nitriles isolated from the distillate include those of lower fatty acids (valeronitrile) and higher fatty acids (palmitic, stearic, etc.). Coal tar has hitherto formed the principal source of pyridine and quinoline, but the increasing use of therapeutic and other products derived from these bases has invested the search for alternative sources of supply with special importance at the present time.

Physical Research in Russia

FOLLOWING a Royal Institution lecture by Professor Cockcroft, comment was made in a leading article in THE CHEMICAL AGE some time ago on the remarkable characteristics of helium, emphasis being placed on its extraordinary behaviour in the neighbourhood of absolute zero, notably its very low viscosity. Hitherto it has been held that liquid helium possesses tremendous thermal conductivity, but according to information which has just reached us, Professor P. L. Kapitsa, Director of the Institute of Physical Problems and a member of the Academy of Sciences of the U.S.S.R., claims that as a result of research he has been able to show that in reality the apparently high thermal conductivity of liquid helium is connected with the suprafluidity of the liquid. Kapitsa is stated, furthermore, to have determined that the value for the viscosity of helium is considerably lower than that found previously and that this gave grounds for assuming that liquid helium in general possesses no viscosity whatever. This, of course, directly contradicts all theoretical conceptions of liquids. In order to ensure adequate supplies of the gas for his researches on the behaviour of liquid helium, Kapitsa developed a new type of machine capable of producing 4 litres of liquid helium an hour, this being 2½ litres more than was possible with the older types of machine. As a result of Kapitsa's work, large quantities of liquid helium have now been placed at the disposal of scientists in the Soviet Union. Kapitsa is now designing a machine for producing gaseous oxygen. The technique in this field has been revolutionised by his discovery of a new method for cooling air without employing high pressures, *i.e.*, four to six atmospheres instead of the 200 required in previous machines. As a consequence, it is claimed, there are grounds for believing that the Soviet Union will soon have at its disposal the cheapest industrial oxygen in the world.

Sulphur Dioxide for Organic Reactions

LIQUID sulphur dioxide is an excellent solvent medium when carrying out reactions involving the use of catalysts of the aluminium chloride type. It is a good solvent both for many organic compounds and for metallic halides (or their double compounds); side reactions are largely suppressed and higher yields of the desired products are obtained in many cases; being non-inflammable it reduces the fire hazards normally associated with reactions in question. Among the numerous reactions which can be performed in liquid sulphur dioxide, according to B.P. 532,685 (Colgate-Palmolive-Peet Co.), are the formation of amyl benzene from tertiary amyl chloride and benzene, of acetophenone from acetyl chloride and benzene, of amyl phenol from tertiary amyl chloride and phenol, of benzophenone from benzoyl chloride and benzene, and of resorcinol monobenzoate from resorcinol and benzoyl chloride. Sulphur dioxide is also a convenient medium in polymerisations (*e.g.*, polyamylenes from di-isoamylene) and isomerisations (*e.g.*, isoamylene and trimethyl ethylene from normal pentene).

MODERN DETERGENTS, II

Advances Due to Recent Research

by GEORGE S. COLLINGRIDGE, B.Sc.

(*Continued from "The Chemical Age," March* 15, 1941, *p.* 152)

ONE characteristic of sesquisilicate that should be recognised by users who combine it with other ingredients is that it absorbs water somewhat more readily than does sodium metasilicate. Metal containers should therefore be used where long storage is contemplated.

Trisodium phosphate (the familiar TSP) is already too well known and widely used to call for detailed comment in this brief survey. Its general utility in paint removers, metal cleaners, dish-washing compounds and detergent specialities generally must, however, be noted. The fact has been pointed out that, among its other advantages, trisodium phosphate serves extremely well in bottle-washing compounds with sodium metasilicate, owing to the fact that it counteracts the unduly high wetting power of the latter. This characteristic high wetting power otherwise tends to cause the detergent solution to creep into the bearings of the bottle-washing machinery and displace the lubricant. The emulsifying and deflocculating properties of trisodium phosphate are quite exceptional. Dr. C. A. Tyler considers that "trisodium phosphate has probably been the basis of more detergent compounders' fortunes than has any other individual ingredient."

Various writers, during recent years, have attempted to evaluate the detergent activity of starch, kaolin, etc., when such materials are incorporated in soaps. The findings are, at best, controversial—although certain selected grades of china clay do actually exert a colloidal detergent effect, since they augment the absorptive powers of the soap for grease and dirt. In fact, experiments have shown that the amount of colloidal kaolin soap required to convert a given quantity of water completely into lather is only about three-fifths of that required when using soap alone; despite the inability of the kaolin to promote a lather by itself.

From the soapmaking point of view, one of the most interesting discussions to appear in print during the past year or two was the paper on the Detergency of Fit and Nigre, by Dr. R. L. Datta and his collaborators.[6] Their experiments, carried out in the Bengal Industrial Research Laboratories, rather surprisingly stress the high detergent value of the nigre as compared with the "fitted" soap separated from it. This indicates that there is some preferential separation of fatty acid constituents in the fitted soap and the nigre, which profoundly affects the detergency of the fitted (*i.e.* resultant) soap. The analyses show some separation of low-molecular acids and fatty acids of lower titre in the nigre. In fact, it

can be deduced that some low-molecular fatty acids favouring wetting and some highly unsaturated fatty acids favouring emulsification had passed into the nigre, thereby maintaining its detergency at the level of the original soap mixture and lowering the detergency of the fitted soap to a considerable degree. Dr. Datta's work on this subject continues.

The detergent action of rosin and rosin-fatty-acid soaps has recently been studied by Pohle and Speh,[7] who have come to the following conclusions as a result of carefully standardised laboratory washing tests: (1) Rosin soaps made from different gum rosins, produced from longleaf and slash pine gums, have equal detergent action; (2) the presence of soaps of oxidised rosin acids has no effect on the detergent action of the rosin soap; (3) the detergent action of soaps made from pyroabietic acid, abietic acid and hydrogenated rosin parallels their ability to lower the surface tension of water and the amount of hydrogen present in the rosin acids; (4) the addition of builders that increase the alkalinity of the rosin soap solution improves the detergent action of the solution; (5) the blending of rosin soap with tallow soap improves the detergent action of the tallow soap in solutions having a soap concentration of 0.25 per cent. or more; (6) temperature affects the detergent action of rosin and coconut oil soaps more than tallow soap.

Sulphated and Sulphonated Detergents

The chemistry, manufacture and application of those important but extremely variegated wetting and emulsifying agents, the sulphonated oils, were briefly discussed by the present writer in a previous issue of this journal.[8] Another and lengthier article on the subject of sulphonated oils appeared under the name of A. E. Sunderland in the American journal, *Soap* (Oct.-Dec., 1935). More recently, a timely and comprehensive volume on the subject has been published, which shows that sulphated, or sulphonated oils as they are usually called, are remarkable not only for the variety of materials which may be sulphated, but also for the variety of products which may be obtained from one material. The compounds produced by the interaction of sulphuric acid and the unsaturated components of a fatty oil are not only complex in themselves, but are liable to be altered according to the washing and neutralising procedure. This new work brings the chemistry of sulphation and related analytical methods completely up-to-date.[9]

Detergents are the most important and most widely used of all textile auxiliaries, and it is largely because of research into improved textile detergents that the introduction on a commercial scale of fatty alcohol sulphates, etc., has been made possible. The disadvantages of ordinary soaps are well known (*e.g.*, formation of insoluble lime and magnesium soaps in hard water, instability in acid media, etc.), and it was these disadvantages that led to the first step away from soap, namely, the sulphonation of oils instead of saponification. From the early Turkey red oils developed the more highly sulphonated products of the Monopol brilliant and Prestabit oil types; but though in many ways admirable, all these products were noticeably lacking in detergent properties. The next research development, the Nekal or naphthalene sulphonate derivatives, also exhibited a low degree of detergency.

The serious attack on soap-substitute problems started in 1926, when chemists began systematically blocking or modifying the carboxyl group, COOH, in saponifiable fats and oils, thus removing the root cause of soap's inherent deficiencies. This led directly to the discovery of the Igepons. Probably the most successful method of dealing with the troublesome COOH group consists, however, in transforming it into the harmless CH_2OH or alcohol group. This material may be sulphonated, to give the popular fatty alcohol sulphates or sulphonates:

$$H_2SO_4 \text{ or } HOSO_2OH + ROH = ROSO_2OH + H_2O$$
$$ROSO_2OH + NaOH = ROSO_2ONa + H_2O,$$

where R is a suitable fatty alcohol. Thus if R is lauryl alcohol, the end-product $ROSO_2ONa$ would be sodium lauryl sulphate.

Investigation along another line has given the polyglycerol esters. Fully esterified glycerin is insoluble, but if partially esterified, solubility and scouring properties appear. If the glycerin is heated at 200°-300° C. in the presence of a catalyst such as caustic soda, one obtains diglycerol, which on part esterification yields a polyglycerol ester with good resistance and excellent detergent properties over a wide range of *p*H values, from 1 to 8.

The Use of "Builders"

A comparatively recent patent[10] relates to detergent compositions containing water-soluble salts of aromatic sulphonic acids. The invention consists in a process for the production of a non-caking free-flowing solid detergent; this comprises the formation of an aqueous solution or suspension of a water-soluble salt of an aromatic sulphonic acid and a builder, and the drying of the aqueous solution or suspension by spray-drying or drum-drying to give a powdered or flaked product having a moisture content of 1.5 to 5 per cent. and an apparent specific gravity of 0.1 to 0.5. The proportion of water-soluble salt of an aromatic sulphonic acid to builder may vary over wide limits, but it is preferred that the composition should contain at least 20 per cent. by weight of the builder. The quantities of materials suspended or dissolved in the drying solution may also vary widely, but it is preferred to employ a solution containing between 10 and 60 per cent. by weight of dissolved or suspended material. The term "builder" refers to the usual water-soluble inorganic salts employed in the soap and detergent industries.

Examples of water-soluble salts of aromatic sulphonic acids which may be employed as the chief active constituent are the dodecyl and tridecyl benzene sodium sulphonates, and water-soluble salts of benzene, toluene, diphenyl, naphthalene, and analogous sulphonic acids which may be either alkylated or not. More specific examples are the alkali metal salts of alkylated naphthalene sulphonic acids, *e.g.*, isopropyl-naphthalene sulphonic acid, alkali metal salts of alklyated diphenyl sulphonic acids, *e.g.*, butyl-diphenyl sulphonic acid, alkali metal salts of hydroxy-diphenyl sulphonic acids, *e.g.*, butyl-ortho-hydroxy-diphenyl sulphonic acid, alkali metal salts of higher alkyl substituted benzene mono- or polysulphonic acids, *e.g.*, such acids substituted with the amyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, tetradecyl and pentadecyl radicals.

The alkyl aromatic sulphonic acids having relatively heavy alkyl groups, *e.g.*, more than 8 and less than 16 carbon atoms, may conveniently be obtained by halogenating kerosene fractions containing the desired number of carbon atoms, condensing with the aromatic hydrocarbon, and sulphonating the product.

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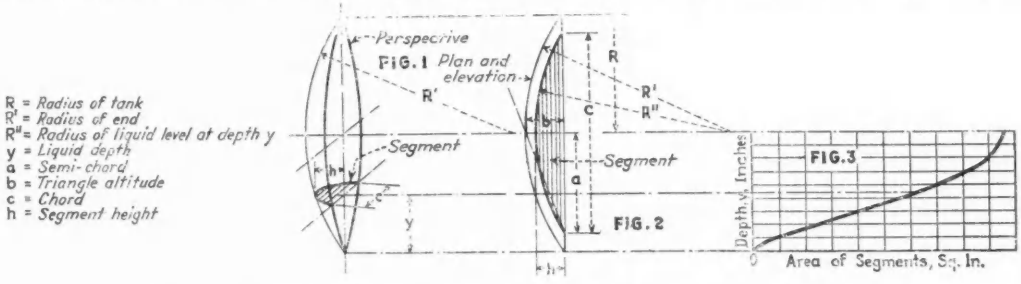
MESSRS. RHODES, BRYDON AND YOUATT, Waterloo Engineering Works, Stockport, have just issued price list 785 (cancelling all previous lists), dealing with their self-priming pumps. It is pointed out that self-priming self-starting pumps are especially useful when the liquid to be lifted is below the level of the pump, and that air leaks, dissolved gases in water or vaporising liquids, etc., cause no trouble when such pumps are in use. Though a standard type of pump is provided, with two external ball-bearings, pumps can be constructed that are suited to dealing with special types of liquid.

Calibrating Horizontal Tanks*

A Simple Method for the Chemical Engineer

ALTHOUGH calibration of horizontal cylindrical tanks with dished ends is a subject that has already occupied a good deal of space in the technical literature, there is a factor involved in most methods previously published which prevents their having the widest possible applicability. These methods are based on standard tanks in which the radius of the dished ends is equal to the diameter of the cylindrical portion of the tank, whereas there are a good many tanks that have an end radius either larger or smaller than the tank diameter. Then again, it is desirable to be able to derive the calibration curve for a given tank, even if standard, when tables or charts for this purpose are not available.

The method proposed depends upon the simple geometry of the dished end. In the accompanying drawings, Fig. 1 is a perspective of one end of the tank showing the liquid level standing at height y above the bottom. Fig. 2 is a cross-section of the tank end which is to be used graphically in determining the volume of liquid in the end for various levels. For this purpose the tank end is laid out to a convenient scale, say 1 in. to 1 ft. The problem now is to determine the actual shape and area of the exposed upper surface of the liquid, when the liquid height is y. The area is that shown shaded in Fig. 1. This is done by considering Fig. 2 first as the elevation and then as the plan of the tank end. The point where the level y touches the end is projected to the tank centre line and then the view is rotated mentally through 90° to become the plan. The distance from this projected point to the centre of rotation of R′, the radius of the end, is R″, the radius of the shaded segment which represents the liquid surface. That the shaded segment so obtained is actually the liquid surface for height y will be evident if one considers a sphere of radius R′, in which liquid stands at any height other than R′. The liquid periphery will be a circle with its centre on the vertical centre line of the sphere, and its radius equal to the horizontal distance to the sphere.



Steps in calibration of horizontal tank ends without use of special tank tables

The area of the shaded segment can be evaluated in various ways. Most engineering handbooks contain tables for the area of a segment in terms of h, the height of the segment, and c the length of the chord. If such tables are at hand, scale the drawing for h and c and determine the area directly. If the tables are lacking, the calculation of the area is one of simple geometry if a protractor is available, or of trigonometry if a table of tangents is at hand. Such calculations are tedious, however, and a somewhat less accurate graphical approximation can be employed. Taking half the segment, construct a triangle of base a and altitude b such that its area approximates that of the half segment. Then the area of the whole segment will be $a \times b$.

To make the calibration the areas of several segments corresponding to a number of liquid levels between zero and half the tank diameter must be determined, each as shown above. These levels need not be at regular intervals, but enough of them must be taken to permit a good degree of accuracy in drawing the curve of Fig. 3. This curve is a plot of the areas of the several segments, against the height of the liquid level. When it has been smoothed it represents at any point the area of the liquid surface in the tank end when the liquid height is as shown. It is now possible to make a table of liquid volumes in the end for the various heights up to half the tank diameter.

This is done by the summation of volumes contained in the end between a number of closely spaced liquid levels. To avoid multiplication, the area scale of Fig. 3 should be expressed in square inches. Then the volume in cubic inches between levels 1 in. apart is very nearly equal to the mean area of each thin slice of tank contents. Using the chart prepared by the method of Fig. 3, read off the area at each 1 in. level from the bottom to the tank centre line. Starting at the bottom at zero add each volume between the 1 in. increments, recording the accumulated volume at each level. Make a second tabulation, multiplying the values in the first column by 2, to give the volume in both ends. As a check of the volume at the midpoint, calculate what this should be from the formula $V = (\pi h/6)\ (3a^2 + h^2)$, where V is the total volume of one end, or the half volume of two ends, h is the height of the total end segment, and a is the half chord, or R.

The tabulation now may be converted to whatever units the completed calibration is to have, such as cubic feet, or gallons. For the former, divide by 1728, for the latter, by 231.

The main body of the tank must now be calibrated for each inch of depth up to the centre line. This may be done in various ways. Handbooks give tables of volumes per inch of depth and foot of length. Or with a table of areas of segments, the volumes at a number of depths can easily be calculated and plotted, so that the volumes at each inch of depth can be read from the curve. Or, the segment areas can be calculated as mentioned above. At any rate, a volume curve should be drawn for the cylindrical portion of the tank, using the units decided on for the final calibration. Then the volumes for each inch of depth are read off and added to the corresponding volumes for the two ends in the tabulation, this last representing the total volume of the tank.

* From an article by Chesman A. Lee in *Chem. & Met. Eng.*, 1941, *48*, 2, 137.

PROTECTION OF CHEMICALS FROM GAS CONTAMINATION

The importance of taking precautions to prevent drugs and chemicals from being contaminated with any poison-gas that might be used by the enemy is noted in a recent circular of the Wholesale Drug Trade Association. Wherever possible, articles that might be damaged in this way should be protected in metal bins or containers with covers kept in position. Liquid preparations should be protected during the process of manufacture and particularly the finished product. Articles packed in cardboard boxes should be stored in such a way that they cannot be damaged—articles packed in tins should have adhesive tape around them so that there is no possible chance of gas working its way to the product.

Income Tax Allowances

Observations on New Provisions

FORMS for the return of income under both Schedules D and E in respect of the year ending April 5 next will shortly be distributed, and although manufacturers and others are doubtless familiar with the main features of income tax, they will probably welcome the following observations on the newer provisions and changes.

According to which returns the higher amount, tax is now payable under either Excess Profits Duty or National Defence Contributions and for income tax purposes such tax is deductible as a trading expense. On the other hand, amounts payable as insurance premiums under the War Damage Bill when it becomes law are to be treated as capital and are, therefore, not deductible either for Excess Profits Duty, National Defence Contributions or income tax purposes.

A new allowance for depreciation has already been envisaged by the Chancellor of the Exchequer. This will be in addition to the present allowable deductions under the Obsolescence Rule (the balance of the sums for machinery and plant in the wear and tear list when obsolete machinery, etc., is replaced); the Renewals Rule (small articles, etc.); and the yearly percentage deductions under the Wear and Tear Rule, and it will apply the deduction procedure already included in the Excess Profits Duty provisions to income tax and National Defence Contributions. The amount which may be deducted will be over and above the ordinary wear and tear allowance for exceptional depreciation in respect of buildings, machinery and plant (provided after January 1, 1937), which may be considered as likely to become redundant or to depreciate in value with the end of the war. Pending a final ascertainment of this special allowance, deductions in respect of periods before the end of the war are permitted up to 10 per cent. of the sum to be allowed, providing the case seems clear for an eventual allowance.

Deductions as trading expenses can be claimed for allowances made to employees called to the colours (or to their wives and children) and similarly for amounts paid to employees for evacuation expenses where place of business has been changed.

Except in cases of actual alterations or additions to the structure of a building which come within the "capital" category, deductions can be claimed in respect of most expenditure for A.R.P. purposes, fire watching, etc. Any A.R.P. equipment, etc., in the nature of machinery, such as fire appliances, air filtration plant and so forth, would qualify for "wear and tear" allowance.

The following are the wear and tear allowances of particular application to the chemical industry, the figures including the extra fifth allowed (by Finance Act, 1938) over and above ordinary percentage allowances:—

Chemical plant (not sulphuric acid plant) ...	9 per cent.
Electrical plant	9 ,,
Other plant	6 ,,
All motor vehicles	24 ,,
Sulphuric acid manufacture:	
Chamber Process: Nitre plant, ammonia oxidation plant, towers and plant used in connection therewith, chambers and incidental plant, chimney stack, de-arsenicating plant, concentrating plant	18 ,,
Contact Process: Towers, blowers, grease-separating and pressure-balancing chambers, heat inter-changers, pre-heaters, superheaters, converters and contact mass, absorption vessels, weighing tanks and machine plant for platinisation and revivification	18 ,,
Either Process: Plant for dealing with sulphur raw material, mechanical and hand burners, power plant, acid eggs, storage tanks, cisterns and connections, fans, pumps, railway tank wagons	18 ,,

Branched-Chain Hydrocarbons

The Use of Reaction-Promoters in Catalysis

THE conversion of straight-chain hydrocarbons into their isomers is now carried out on a vast scale by the petroleum and allied industries. Lower saturated members like isobutane and isopentane are important intermediates in the manufacture of anti-knock petrols, while isobutylene is polymerised to rubber-like materials. Isomerisation is generally effected by heating the corresponding normal hydrocarbons in the presence of a metallic halide catalyst, but it is only in recent years that the operating conditions leading to high yields of the branched-chain members have been established.

High Boiling Points Avoided

Formation of by-products with undesirably high boiling points was one of the early drawbacks. In the case of butane this has been overcome by passing the vapour at below 200° C. over a catalyst mass comprising aluminium chloride deposited on pumice or silica at a rate allowing for a contact time of only some 20 seconds (B.P. 517,758). An exceptionally efficient support for the halide catalyst is a substance like kaolin or pipeclay which contains a small percentage of water, the latter reacting with the aluminium chloride to form hydrochloric acid which acts as a reaction-promoter (B.P. 516,659). A mixture of 88.5 mol. per cent. *n*-butane and 11.5 mol. per cent. isobutane was passed at 150° C. and a contact time of 93 seconds over a mixture of 74.8 parts freshly sublimed aluminium chloride and 29.8 parts pipeclay, the latter substance having been previously dried at 300° C. The reaction product contained 46 per cent. *n*-butane and 54 per cent. isobutane. Under otherwise identical conditions the use of a pipeclay which had been dehydrated at 1100° C. resulted in a yield of only 26 per cent. isobutane.

The catalytic efficiency of aluminium chloride, when used alone or in the presence of hydrochloric acid, is improved by the employment of anhydrous ferric chloride as promoter (B.P. 528,178). 116 gm. butane which had been previously saturated with hydrochloric acid were agitated in a steel pressure vessel for 24 hours at 100° C. with 13.35 gm. aluminium chloride containing 1.7 per cent. ferric chloride. This treatment resulted in 80.24 per cent. conversion to isobutane. In the absence of ferric chloride the conversion was 61.1 per cent., while in the absence of both ferric chloride and acid it was only 25.92 per cent.

Gustavson Compounds

Promising results have been obtained by the use as catalysts of the so-called Gustavson compounds. The latter are double compounds of aluminium halides and aromatic hydrocarbons such as butyl benzene and tripropyl benzene. They are generally liquids which are stable at below 150° C., but decomposed by water. In one example of their application (B.P. 526,215) 40 c.c. of the aluminium chloride-butyl benzene complex were heated with 100 gm. *n*-pentane for 2½ hours at 35° C. and 18 hours at 20° C. to form a reaction product containing 8.7 per cent. isobutane and 18.3 per cent. isopentane, the balance being unchanged *n*-pentane.

The efficiency of aluminium chloride or its Gustavson compounds is adversely affected by carbon monoxide and sulphur compounds. Elimination of such impurities from a polymerised cracked butane-butylene fraction is effected by spraying the crude material into the top of a tower packed with Raschig rings and provided with a cooling coil at the top and a heating coil at the bottom. Carbon monoxide escapes at the top and the butane passes from the tower at the bottom into a scrubber packed with caustic potash which absorbs sulphuretted hydrogen. The purified butane is mixed with hydrochloric acid before entering the catalyst chamber which is packed with a mixture of aluminium chloride and kaolin. The formation of other catalyst poisons by reaction between the acid and the lubricant of the feed pump used for the latter is prevented by the use of a lubricant of the polymerised alkene type (B.P. 530,253).

The Institute of Metals
Council's Report at Annual Meeting

THE thirty-third annual meeting of the Institute of Metals was held at 4 Grosvenor Gardens, S.W.1, on March 5. The President, Lieut.-Col. the Hon. R. M. Preston, D.S.O., was in the chair.

In presenting the annual report, the Secretary stated that the Council regretted the non-fulfilment of the hope expressed a year ago by the retiring president that the president might "be able to point to a condition of peace." The war continued to present many fresh problems to the Council. Though it hampered some of the Institute's activities on the social side, it brought out the Institute's value—particularly through the *Journal*, the Joint Library, and the Information Department—to members faced with special technical problems in their daily work of furthering the success of the nation's effort to meet the varied requirements of H.M. Forces. The supply in war-time of non-ferrous metals and alloys by members and their firms had been a heavy undertaking, and the Institute had had its share of the problems involved.

Membership had been well maintained. That the roll showed a drop of 100 was not surprising in view of the removal of the names of members in Germany and Italy. The names of members in countries over-run by Germany had been placed on a suspense list. They were included in the total of 2237, but in present conditions could not contribute to the Institute's subscription income. The War-Time Emergency Fund helped to make good this loss of income and to meet the extra costs of paper for the *Journal*, stationery, postage, and other items. The Council was very grateful to the firms who have so generously contributed to the fund. During the year Professor A. M. Portevin was appointed an honorary member. Mr. John Fry was appointed a Fellow on relinquishing the honorary treasurership, which he had held for 16 years.

Lieut.-Col. Preston was re-elected President of the Institute and other officers and members of the Council were elected as follows:—Vice-president: Dr. W. T. Griffiths; Members of Council: Mr. Roosevelt Griffiths, Dr. J. L. Haughton, Mr. F. S. Mitman, and Dr. H. Sutton, D.Sc. The election, since the last meeting, of 52 ordinary members and 28 student members was announced.

It was announced that the 1940 Institute of Metals Platinum Medal had been presented to Dr. Paul D. Merica. The medal could not be personally presented by the president, as is customary, but it was presented at the British Embassy, Washington, D.C., by Lord Halifax, the British Ambassador to the U.S.A. The president announced that Dr. C. H. Desch, F.R.S., past-president, had been nominated to receive the Institute of Metals Medal for 1941. The medal, which is placed yearly at the disposal of the Council by the Mond Nickel Company, Ltd., is awarded "for outstanding services to the non-ferrous metal industries."

The meeting concluded with a short address from the president, in which he urged that the Institute should extend its bounds to include the refinery, and even the smelting, of metals and mineral ores. These subjects were covered in theory by the Institution of Mining and Metallurgy, but in fact the great majority of mining men had little time for the long-term research essential to the development of their industry. Speaking as a mining man with no more than a smattering of knowledge of the many intricate problems of non-ferrous metallurgy, Colonel Preston stated that he felt sure that some form of close co-operation between the Institute and the mining interests would be of great benefit to both parties. It would enlarge the scope, the usefulness, and the influence of the Institute of Metals; for the miners it would help in the solution of many problems which the harried practical man, intent on production, had little time to consider.

A Chemist's Bookshelf

THE SAMPLING AND CHEMICAL ANALYSIS OF CAST FERROUS METAL: 3rd Ed. By E. Taylor Austin, F.I.C. Birmingham: The British Cast Iron Research Association. Pp. 140. 15s.

This work, originally published in 1929, and now rewritten and greatly enlarged, lists all available methods for the sampling and chemical examination of cast ferrous metals, excluding steel, though the majority of the methods are applicable to this material. It covers the determination of all the elements commonly found in white and grey cast iron, pig iron, and malleable cast iron. Methods are also described for ascertaining the amounts of less common elements present in these materials. A completely new section dealing with the examination of ferro-alloys has been added in the present edition.

Many of the procedures have undergone considerable modification and much new material covering recent analytical developments has been incorporated in the text. Alternative methods are given in many instances and their comparative accuracy and limitations discussed. The basic chemical principles underlying each procedure are separately treated in order to assist the reader's understanding of any particular process. General laboratory technique is described and recommended analytical tolerances are given; and notes are included on the care and maintenance of platinum apparatus.

CANNING PRACTICE AND CONTROL: 2nd Ed. By Osman Jones, F.I.C., and T. W. Jones, B.Sc., F.C.S. London: Chapman and Hall. Pp. 311. 32s.

It is some indication of the demand for this large and well-produced volume that, after an interval of only four years, a second edition should be called for. The authors' modest aim, expressed when they brought out the first edition, that they "might put together a book of practical value," has surely been fulfilled; and it is significant that practically all the revision that the volume has had to undergo has been in the form of additional matter. The standard practices detailed in the first edition still hold good for the most part. Incidentally, one of the most attractive additions is the number of new illustrations that have been provided.

Curiously enough, the most conspicuous addition—a whole chapter on packing foods in glass containers—belies the authors' original definition of their subject, *viz.*, "foodstuff hermetically sealed and processed in a metal container." But, as they point out, this form of food-packing is now practised by so many canners, that the chapter was included to complete the book as a work of reference. New methods of analysis in the examination of canned food are of particular importance to the chemist, and, in these days especially, Chapter XV, with its clear exposition of the methods of fat rendering and solvent extraction of animal waste, bears careful rereading.

IRON-NIOBIUM ALLOY

A new alloy which possesses great strength at high temperature has been developed by the General Electric Research Laboratories, Schenectady, U.S.A. It consists of iron with a small amount of niobium (columbium), a relatively rare element for which but few uses have been found. The niobium exists in the new alloy as a definite chemical compound with the iron, but is finely dispersed. Alloys containing 3 per cent. niobium have high rupture strength at 600° C. and can be used extensively in steam turbines, where metals are subjected to great stresses at high temperature.

Exports from Canada

Large Increases to Empire Countries

SOME remarkable results are revealed in the recently published analysis of Canadian exports for 1940. There is no space here to publish full details, but some of the increases are extraordinarily satisfactory.

Exports to Egypt showed the most remarkable increase, rising to $8.4 million from less than $400,000 in 1939, with $4.8 million of the total in the single month of December. There were phenomenal rises in the purchases of Canadian goods by most of the Empire countries. Exports to the Union of South Africa at $37.8 million and to British India at $11.6 million were more than double the 1939 value. Those to Newfoundland at $12.6 million, to Ireland at $5.8 million, to the Straits Settlements at $4 3 million, and to British Guiana at $2.6 million, all increased by one-half. Shipments to British East Africa rose from $793,000 to $4.8 million. Exports to all Latin-American countries except Colombia recorded a marked increase, and Portugal proved an excellent customer by taking $1.35 million worth of goods as against $170,000 in 1939.

The United Kingdom and United States, of course, were the largest importers, accounting together for 81 per cent. of the total exports (77 per cent. in 1939). The former, at $508 million, was the largest customer, outstripping the U.S. figure of $443 million, though both showed a considerable rise, the corresponding 1939 figures being: U.K., $328 million; U.S., $380 million. The grand total value of exports, at $1179 million, was 27 per cent. higher than 1939 and 18 per cent. higher than the peak year of 1937.

Dichloroethylene Plastics

Copolymers with Vinylidene Chloride

THE substance known as asymmetrical, or 1:1-dichloroethylene is a liquid boiling at 37° C., which has been known for about 50 years. Only in the last two or three years has it acquired commercial importance, but it is now used on a large scale in the United States for the manufacture of plastic materials. It is more commonly known as vinylidene chloride, which name at once indicates its close relationship to vinyl chloride and suggests the possibility of conversion, like the latter, into plastic materials. In fact both these substances form the basis of synthetic textiles, vinyl chloride entering into the manufacture of Pe-Ce fibre and Vinyon, while a synthetic product resembling rattan is now made from Saran (a vinylidene chloride-vinyl chloride copolymer plastic introduced to the American market last year). Seats in coaches on the New York "Subway" are now being covered with this hard-wearing synthetic fabric. Another important application is to the manufacture of bonded abrasive wheels.

Vinylidene chloride in itself is not a particularly promising material from the standpoint of the plastics manufacturer: it is liable to polymerise with uncontrollable violence, while the polymer is a hard solid which softens at about 200° C. and decomposes at a slightly higher temperature. These properties are serious drawbacks, but they can be eliminated by mixing the vinylidene chloride with a relatively small percentage of another polymerisable substance before subjecting to polymerisation. Selection may be made from an enormous number of copolymerising ingredients, a few examples being vinyl acetate, vinyl chloride, divinyl ether, ethyl acrylate, methyl methacrylate, styrene, butadiene, diallyl maleate, allyl chloride, allyl crotonate and triallyl borate. The copolymer from 93.5 parts vinylidene chloride, 3 parts methyl methacrylate and 3 parts ethyl acrylate softens at 160° C.; that from 21 parts vinylidene chloride and 9 parts allyl chloride softens at 143° C. and decomposes at 199° C. Almost endless scope for the production of materials ranging from rubbery solids to very hard resins is offered by suitable variations in the number of copolymerising ingredients and their relative proportions.

Some examples of three-component copolymers made by polymerisation in aqueous emulsion under pressure are described in B.P. 525,048 (I.C.I., Ltd.). A tough mouldable resin was formed from 30 parts vinylidene chloride, 8 parts methyl vinyl ketone and 12 parts styrene, while a powdery resin softening at a much lower temperature was obtained when the methyl vinyl ketone was replaced by an equal quantity of methyl acrylate and the styrene by an equal quantity of methyl methacrylate.

Metallic Sodium

Increasing Quantities Used in Germany

PRODUCTION of sodium metal in Germany has been increased in recent years and the prospects are that further gains will be recorded. One of the principal causes for these gains has been the increased use of sodium in connection with the manufacture of aluminum and magnesium alloys. With the greatly expanded use of these light metal alloys for various manufacturing purposes, particularly the manufacture of aircraft, the demand for sodium metal has correspondingly increased.

Increasing quantities of metallic sodium are also being consumed by the electro-technical industry. Demand has been stimulated by the use of sodium vapour lamps for illumination. Since sodium is an excellent conductor of electricity, wires consisting of sodium metal cores provided with copper mantles have been finding increasing application.

For some years, moreover, an outstanding field of application for sodium metal has been in the manufacture of sodium cyanide and sodium peroxide. Sodium cyanide is an important material for cyanidation in the production of gold, as well as for galvanising purposes. Sodium peroxide is used as a bleaching agent in the textile industry.

The most important source of the increased demand for metallic sodium in recent times, and one which is destined to gain steadily in the future, is for organic chemical syntheses. An outstanding use in this sphere is for the manufacture of Buna, the output of which has expanded considerably since the outbreak of war, sodium being used as contact metal in the process of polymerisation from butadiene.

The demand for metallic sodium in Germany has been given a particularly marked impetus since June, 1939, when tetraethyl lead, for the manufacture of which sodium is required, was introduced as a compulsory anti-knock agent in motor fuel, largely in replacement of ethyl alcohol, till then almost the only anti-knock agent used in Germany.

Among miscellaneous uses for sodium metal is the removal of traces of oxygen and moisture from rare gases, such as neon, helium, argon, and krypton.

Silicononyl Alcohol

Simplified Method of Preparation

A PROCEDURE for the preparation of "silicononyl alcohol," $(C_2H_5)_3Si.C_4H_4OH$, avoiding the vague and cumbersome phraseology of the classic account by Friedel and Crafts, and providing at the same time data on the yields, is reported by E. L. Niedzielski (*J. Am. Chem. Soc.*, 1940, *62*, 12, 3519).

As starting material tetraethylsilane (siliconononane) was used which was transformed into triethyl-chloroethyl-monosilane according to Friedel and Crafts. Ten grams of the chloro compound were refluxed for three hours with 5 gm. fused potassium acetate and 1.5 gm. acetic acid. The reaction product was poured into excess of water, separated, dried and submitted to fractionation, yielding 3.2 gm. of a fraction boiling between 208° and 214° C. which consisted of triethyl-acetoxyethyl-monosilane (yield 28 per cent.). This fraction was refluxed with 10 c.c. of a 22 per cent. solution of alcoholic potassium hydroxide. After three hours the product was transferred into excess of water and the isolation procedure given above for the acetate was applied. As a result 1.2 gr. silicononyl alcohol (b. p. 190° C., uncorrected) was obtained amounting to a yield of 48 per cent.

Personal Notes

DR. EDWARD A. DOISY, Professor of Biochemistry at the St. Louis University School of Medicine since 1923, has been awarded the Willard Gibbs Medal by the Chicago section of the American Chemical Society. He is particularly well known for his work on hormones and vitamin K.

DR. JAMES BRYANT CONANT, President of Harvard University, the distinguished chemist who has arrived in this country on a special scientific mission from the United States, received the honorary degree of D.Sc. at the Senate House, Cambridge, on March 14. Dr. Conant is already an honorary Fellow of Emmanuel College.

Members of the Newcastle Chemical Industry Club were pleased to have their President, MR. A. TROBRIDGE, take the chair at the 22nd annual meeting held recently. In so doing he belied his confessed diminishing activity consequent upon entering his 82nd year, as the travelling conditions, immediately after the great north-east snowstorm, were anything but pleasant. This mark of his continued interest in the club, of which he was a founder member and honorary secretary for many years, was greatly appreciated by those present, and his re-election was unanimous.

LORD PORTAL, D.S.O., M.V.O., Parliamentary Secretary, Ministry of Supply; MR. GEORGE TOMLINSON, M.P., Parliamentary Secretary, Ministry of Labour; SIR NIGEL CAMPBELL; MR. CHARLES DUKES, National Union of General and Municipal Workers; MR. C. U. PEAT, M.C., M.P., Parliamentary Private Secretary to the President of the Board of Trade; and MR. M. WATKINS, Managing Director, John Lewis, Ltd., London, have been appointed additional members of the Industrial and Export Council. They have consented to serve also on the committee of the Council which has been appointed to assist in the concentration of industries.

MR. L. GERALD FIRTH, the president of the Firth-Sterling Steel Co., McKeesport, U.S.A., a native of Sheffield, and the son of Mr. Lewis Firth, who for many years was the managing director of Firth-Browns, Sheffield, is seeking to establish a "family feeling" between McKeesport, which has a population of 55,000, and Sheffield. In a letter to Mr. J. Wortley Fawcett, a director of Thos. Firth and John Brown, Ltd., Mr. Firth writes of the enthusiastic work by his fellow-citizens for British war relief and mentions that the workers of his company have asked that the first two mobile kitchens subscribed to by them should be assigned to the Sheffield district.

OBITUARY

LIEUTENANT JOHN HERON ROGERS, R.N.V.R., whose death on active service during the month of March has been announced, was the son of Mr. F. Heron Rogers, President of the Institution of Chemical Engineers.

Chemical Matters in Parliament

Starch Supplies

IN the House of Commons last week Mr. Graham White asked the Parliamentary Secretary to the Ministry of Food why the proposal to restart the Monitrie farina factory was not proceeded with.

Major Lloyd George replied that no decision had been taken not to restart the Monitrie factory. The question was now under examination in the light of the present starch supply position.

In reply to a further question from Mr. White as to whether action would be taken in the matter, having regard to the time during which it had been under consideration, and the possibility of a growing shortage of starch, Major Lloyd George said that there would be no undue delay, the question of starch supplies being very much as it was.

Iron Ore in Northern Ireland

Dr. Little inquired further regarding the percentage of iron in the samples of iron ore taken in County Down; and whether the Minister of Supply would explore still further in that region with the object of taking additional samples for testing.

Sir Andrew Duncan, in reply, stated that the samples taken showed great variations. The excavations were at present waterlogged, but he was prepared to consider further sampling when conditions became favourable. He added that the veins were very small and that the accessibility of the ore in quantity was a matter of vital importance.

New Control Orders

Aluminium Scrap

THE Admiralty has issued the Segregation of Aluminium and Aluminium Alloy Scrap (Admiralty) Order 1941 (S.R. & O. 1941, No. 281). The order came into effect on March 3 and concerns those undertaking Admiralty work. Provision must be made for the collection, segregation, and storage of aluminium and aluminium alloys scrap in accordance with Admiralty directions.

Export Licensing

Under the heading "New Control Orders" in our last week's issue (p. 155) reference was made to the control of certain chemicals and ores to certain destinations, under S.R. & O. 1941, No. 308. Details of these commodities have now come to hand.

Licences will, from March 27, be required for the export, to all destinations, of aluminium sulphate, citric acid, sodium aluminate, ammonium chloride, argol and other crude tartrates, and tartaric acid and its salts (excluding potassium antimony tartrate and morphine tartrate), as well as starches and waxes, as already indicated.

Licences will be required for the export, to certain specified destinations, of arsenic ore, cadmium ore, and cobalt ore.

Mixed Cellulose Esters

Decrease in Acetone Solubility

CELLULOSE acetobutyrate and acteopropionate are mixed esters introduced in the last few years to the lacquer industry which are enjoying increasing popularity by virtue of their superiority in certain respects to ordinary acetone-soluble cellulose acetate. Mixed esters in which one of the esterifying acids is dibasic are not yet commercial products and some experiments on the formation of cellulose aceto-adipates recently described by Sakurada and Matumoto (*J. Soc. Chem. Ind. Japan*, October, 1940, p. 349B) should be of interest. Esterification was conveniently effected by reacting adipyl chloride with cellulose acetate in pyridine solution and the mixed esters were found to contain a proportion of the adipyl radical in the form of the half ester. In a typical case the cellulose acetate with an ester value of 222 (*i.e.*, 222 out of each 300 hydroxyl groups in the cellulose molecule were replaced by acetyl) was converted into a mixed ester in which 22 further hydroxyl groups were replaced by the adipic radical as the half ester and a further 22 groups as diester, while 34 groups still remained free. The new mixed esters were by no means as soluble in acetone or other lacquer solvents as the original cellulose acetate.

A new daily tear-off device developed by the LEEDS AND NORTHRUP CO. enables users of Micromax strip-chart recorders to file a record of each day's operation. Made to fit standard Micromax recorders, th edevice can be quickly and easily attached. A rubber stamp can be furnished which identifies the recorder and the location of the thermocouples. The cost is between $10 and $15 according to whether or not a time-stamped paper is used. Complete details are provided in Folder N-163(1), issued by the Leeds and Northrup Co., 4934 Stenton Avenue, Philadelphia, Pa.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MAGNESIUM SILICATE PIGMENTS, and coating-compositions containing same.—E. I. du Pont de Nemours and Co. (United States, Dec. 12, '39.) 17541.

TREATMENT OF BOILER FLUE GASES.—W. Francis, Simon-Carves, Ltd., Mayor, Aldermen and Councillors of the Metropolitan Borough of Fulham. 17385.

PROCESS OF TREATING ANIMAL FIBRES, ETC.—J. R. Geigy, A.-G. (Switzerland, Dec. 11, '39.) 17498.

MANUFACTURE OF DISAZO DYESTUFFS.—J. R. Geigy, A.-G. (Switzerland, Dec. 11, '39.) 17506.

MANUFACTURE OF SOLUBLE CELLULOSE ETHERS.—A. A. Houghton and Imperial Chemical Industries, Ltd. 17542.

PRODUCTION OF POLYMERIC MATERIALS.—J. R. Lewis, L. B. Morgan, J. T. Watts, and Imperial Chemical Industries, Ltd. 17362.

REFINING OF OILS.—Low Temperature Carbonisation, Ltd., G. S. Pound, and S. R. Ellis. 17477.

MANUFACTURE OF GLASS SUBSTITUTE.—Lumsden and Mackenzie, Ltd., C. Garrett, and J. A. Addie. 17461.

MANUFACTURE OF TRANSPARENT SHEETS.—J. R. Myles, L. Snowden, and Imperial Chemical Industries, Ltd. 17363.

MOULDING OF SYNTHETIC RESINS.—Parnall Aircraft, Ltd., A. G. Frazer-Nash, and G. K. Hills. 17321.

LOW TEMPERATURE CARBONISATION PROCESSES, and products obtained thereby.—Pittsburgh Coal Carbonisation Co. (United States, Aug. 2.) 17406.

PRODUCTION OF CHROMIC CHLORIDE.—Pittsburgh Plate Glass Co. (United States, Dec. 23, '39.) 17525.

CHLORINATION OF CHROMIUM-BEARING MATERIALS.—Pittsburgh Plate Glass Co. (United States, Nov. 30, '39.) 17526.

MANUFACTURE OF QUATERNARY AMMONIUM COMPOUNDS.—Roche Products, Ltd., F. Bergel, A. Cohen, and N. C. Hindley. 17527.

PREPARATION, ETC., OF SUGAR SUBSTITUTES.—A. Rosenthal. 17487.

PROCESS FOR PREPARATION OF ANTHRAQUINONE DERIVATIVES.—Sandoz, Ltd. (Switzerland, Dec. 9, '39.) 17316.

METHOD FOR USE OF LUMINOUS POWDER.—L. Schoen. 17431.

MANUFACTURE OF COMPOSITE ARTICLES.—Scientific and Industrial Research, Honorary Advisory Council for. (United States, Dec. 7, '39.) 17483.

MEASURING-GAUGES.—F. E. Woodward. 17427.

Complete Specifications Open to Public Inspection

PRODUCTION OF ETHERS of polyhydric alcohols.—E. I. du Pont de Nemours and Co. June 6, 1939. 9754/40.

MANUFACTURE OF CHROMIUM COMPLEX COMPOUNDS of ortho-oxyazo-dyestuffs.—Soc. of Chemical Industry in Basle. (Cognate Application, 9833/40.) June 6, 1939. 9832/40.

PROCESS FOR THE PREPARATION OF *d*-LYSERGIC ACID-*d*-*l*-HYDROXY-BUTYLAMIDE-2.—Sandoz, Ltd. June 6, 1939. 9896/40.

PROCESS FOR THE PREPARATION *d*-LYSERGIC ACID-*l*-3-DIHYDROXY-TRI-METHYLENE-AMIDE-2.—Sandoz, Ltd. June 6, 1939. 9897/40.

MANUFACTURE OF CONDENSATION PRODUCTS from primary aliphatic aldehydes.—Dr. A. Wacker Ges. fur Electrochemische Industrie Ges. May 27, 1939. 10476/40.

PRESSES FOR THE MANUFACTURE OF ARTICLES OF ARTIFICIAL RESIN and the like.—O. Kristoffersen. June 5, 1939. 15238/40.

Complete Specifications Accepted

EMULSIFIERS, and the production of emulsions.—A. Herlow. March 17, 1938. 530,240.

DETERGENT AND GERMICIDAL COMPOSITIONS.—Mathieson Alkali Works. March 24, 1938. 530,040.

MANUFACTURE OF SUPERPHOSPHATE FERTILISERS.—Davison Chemical Corporation. June 15, 1938. 530,244.

APPARATUS FOR THE SEPARATION OF IMMISCIBLE LIQUIDS.—Aladdin Industries, Ltd., H. C. Hebard, and B. S. Dearing. May 17, 1939. (Cognate Application, 21323/39.) 530,248.

INSECTICIDAL COMPOSITIONS.—J. R. Booer, and Leyton Manufacturing Co., Ltd. May 30, 1939. 529,988.

MANUFACTURE OF MOTOR FUELS.—Texaco Development Corporation. June 25, 1938. 530,250.

PRODUCTION OF MIXED ADHESIVES.—Henkel and Cie. Ges. August 5, 1938. 529,993.

PREPARING RESINOUS CONDENSATION PRODUCTS.—Armour and Co. June 1, 1938. 529,996.

MANUFACTURE OF REACTIVE MAGNESIUM OXIDE.—F. Elkington, and H. H. Chesny. May 31, 1939. 530,048.

REMOVAL OF MERCAPTANS from hydrocarbon distillates.—N. V. de Bataafsche Petroleum Maatschappij. June 25, 1938. 529,997.

PRODUCTION OF BRANCHED CHAIN HYDROCARBONS.—J. G. Fife (N.V. de Bataafsche Petroleum Maatschappij). June 1, 1939. 530,253.

METHOD OF REMOVING ARSENIC, antimony and phosphorus from ores.—Uddeholms Aktiebolag. June 4, 1938. 530,049.

VAPORISING FURNACE for zinc and other metals.—M. G. Dixon (International Smelting and Refining Co.). June 2, 1939. 530,054.

MANUFACTURE OF AZO DYESTUFFS.—Imperial Chemical Industries, Ltd. June 4, 1938. 530,169.

PRODUCTION OF CONDENSATION POLYMERS.—E. I. du Pont de Nemours and Co. June 24, 1938. 530,267.

MANUFACTURE OF THE NITRILES or organic carboxylic acids.—H. Dreyfus. June 7, 1939. (Cognate Application, 19707/39.) 530,269.

PRODUCTION OF ALBUMIN AND ALCOHOL from vegetable juices.—Celec Corporation, Ltd., S. M. Phillips and A. Baker. June 8, 1939. 530,270.

PRODUCTION OF THERMOPLASTIC MATERIALS in fibrous or cellular form.—W. I. Taylor. June 8, 1939. 530,271.

PLASTIC MOULDING-COMPOSITIONS.—British Thomson-Houston Co., Ltd. June 8, 1938. 530,007.

METHOD OF AND APPARATUS FOR CONTINUOUSLY AND AUTOMATICALLY SEPARATING THE SOLID CONSTITUENTS from the liquid constituents of a cyanided ore pulp, and for separating the precipitates from cyanide solutions.—A. E. Jeffery, and J. A. Neville. Feb. 3, 1939. 530,009.

METHODS OF BONDING RUBBER to fibrous materials.—United States Rubber Co. July 2, 1938. 530,011.

COLOURATION OF TEXTILE MATERIALS.—British Celanese, Ltd. June 14, 1938. 530,013.

British Chemical Prices

Market Reports

WITH few exceptions there is no change to report in quotations for the general run of chemicals and the price position throughout the market is steady with a firm undertone. The controlled rates for sulphuric acid have been revised and are a little higher, and quotations for carbonate of potash have been reduced as from March 12, the hydrated by 5s. per ton and the calcined by 30s. per ton. So far as new business is concerned most sections of the market report a steady demand with export inquiries receiving the chief attention. Acetic acid, tartaric acid and citric acid are in good call and chlorate of soda is an active item. Available supplies of nearly all the potash materials are quickly absorbed and values have a higher tendency. There is no feature to record this week in the market for coal tar products and the volume of trade is moderate with values fairly well maintained.

MANCHESTER.—Output restrictions in what are officially regarded as the less essential industries are expected to make their influence felt on the consumption of chemicals before long. In the meantime, however, there has been a fairly satisfactory call for contract supplies of the leading heavy materials on the Manchester market, whilst a moderate volume of fresh business has been reported. Price movements have again been few, though general market conditions are firm. Among the by-products crude tar, creosote oil and the xylols and other light materials are all meeting with an active demand and values are very strong.

GLASGOW.—The position in the Scottish heavy chemical trade remains unchanged. Both home and export business continues to be rather quiet, with prices keeping firm.

Price Changes

Antimony Sulphide.—Golden, 10d. to 1s. 6d. per lb. Crimson, 1s. 8½d. to 2s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Cadmium Sulphide.—5s. 6d. to 6s. 6d. per lb.

Carbon Black.—5d. to 7¾d. per lb., according to packing.

Chrometan.—Crystals, 5½d. per lb., liquor, £23 per ton d/d station in drums.

Copper Sulphate.—MANCHESTER: £29, less 2 per cent. in 5 cwt. casks, f.o.b. Liverpool.

Creosote.—MANCHESTER: 5½d. to 7½d. per gal.

Cresylic Acid.—97/99% 1s. 11d. to 2s. 6d. per gal.; Pale, 99/100% 2s. 2d. per gal.

Methyl Acetone.—40.50%, £45 to £46 per ton.

Naphtha.—Solvent, 90/160° 2s. 3d. to 2s. 6d. per gal.; Heavy, 90/190° 1s. 7d. to 1s. 8d.; naked at works.

Pyridine.—90/140° 17s. per gal.; 90/160° 13s. 6d.; 90/180° 4s to 5s. per gal., f.o.b.

Sodium Sulphate (Salt Cake).—Manchester: £4 7s. 6d. ex works.

Sulphur.—Finely powdered, £18 10s. per ton d/d., precip. B.P., 68s. per cwt.

Sulphuric Acid.—168°Tw., £6 10s. to £7 10s. per ton; 140°Tw. arsenic-free, £4 11s. per ton; 140°Tw., arsenious, £4 3s. 6d. per ton; quotations naked at sellers' works.

Vegetable Lamp Black.—£44 per ton.

Wood Tar.—£4 to £6 per ton, according to quality.

Xylol.—Commercial, 3s. 4d. to 3s. 5d. per gal.; pure, 3s. 6d.

General News

THE WORSHIPFUL COMPANY OF CLOTHWORKERS has recently established, in the University of London, the William Gilles Fellowship of Science. The award, open to internal or external graduates, will be made biennially, and will be of the value of about £220.

NEARLY 800 BRITISH PATENT SPECIFICATIONS dealing with the treatment and application of latex have been issued since the publication of *Rubber Latex*, in November, 1936, by the British Rubber Publicity Association, 19 Fenchurch Street, London, E.C.3. The patent abstracts have therefore been brought up to date by a supplement which will be forwarded by the Association, free of charge, on request.

THE BOARD OF TRADE INDEX NUMBER for wholesale prices of industrial materials and manufactures for the month of February is 152.9 (1930=100). For chemicals and oils the figure is 124.4; for iron and steel 180.8; and for non-ferrous metals 124.2. Compared with January, 1941, these figures show respective rises of 0.4, 0.3, and 0.6 per cent. Increases were generally small in the items covered by these three groups, though imported iron ore was dearer and the price of tin rose about 3 per cent.

SPEAKING ON "Oil and the Search for It" at the Glasgow Centre of the Royal Scottish Geographical Society, last Saturday, Dr. J. V. Harrison said that Germany might count on a supply of about 13 million tons of crude oil annually, which she could make go a very long way, even in war time. The supply of adequate lubricating oil, however, was a much more difficult matter, as this could not be manufactured from every sort of crude oil, and it was significant that since the war it was the import of lubricating oil that had bounded up far more than that of petrol.

THE COMMERCIAL LIBRARIAN of Southwark has been paying an unsolicited testimonial to trade journals. The Southwark Borough Council has provided temporary accommodation at its Commercial Library for local firms damaged by enemy action. Such firms have been able to reconstruct some of their records with the aid of the wide range of material available there. The Commercial Librarian is approaching trade journals with a request that they will help to spread this news for him, for, he says, "our experience proves that trade papers are read very carefully, and the contents digested very thoroughly by those interested." The questions that have been answered satisfactorily with the combined help of the Commercial Library and trade papers include, to our knowledge, the price of "elephants' tails."

Foreign News

DURING THE FIRST HALF of 1940 tartaric acid imports into Egypt increased to 22,954 kg., valued at £E3569, as against 17,980 kg. (£E1774) for the same period of 1939.

IMPORTS OF AMMONIUM CHLORIDE into the U.S., according to preliminary statistics for 1940, were 1352 short tons, approximately a quarter of the volume for 1939.

THE 100 PER CENT. CUSTOMS SURCHARGE on goods entering Guatemala has been removed from goods manufactured in any part of the United Kingdom.

THE DIAMOND ALKALI CO., of Texas, is to start construction almost at once, at Dallas, Texas, of a new plant to manufacture sodium silicate and silicate products.

IMPORTS OF GLYCERINE into Burma in the first eleven months of 1940 amounted to 413 cwt., valued at 23,446 rupees, compared with total imports for the whole of 1939 of 379 cwt.

THE IMPORTATION FROM BRAZIL OF BAUXITE and of a new coffee plastic, which is shortly to be manufactured in a plant now in construction in S. Paulo, was suggested to the British Economic Mission during its recent visit to Brazil.

IT IS REPORTED FROM GERMANY, via the United States, that aluminium "wool," made of fibres of 0.03 mm. diameter, is being used to replace asbestos for railway carriage brake-lining. Each fibre is covered with a synthetic rubber coating.

UNDER A DECREE dated February 22, the following are added to the list of goods the exportation of which from Brazil is prohibited except under licence: all forms of copper, brass, bronze, zinc and nickel, and compounds of potash and potassium fertilisers.

From Week to Week

SULPHAPYRIDINE HAS BEEN ADDED to the list of chemicals made in Canada for the purpose of the administration of tariff item 208t. The ruling to this effect came into operation on February 18.

CORNELL UNIVERSITY is to have a new building for the School of Chemical Engineering, to be erected at a cost of $700,000. The donor is Mr. Franklin W. Olin, president of the Western Cartridge Co., a civil engineering graduate and trustee of the university. Construction will begin immediately and should be completed by October, 1941.

DRILLING OF THE FIRST TEST OIL WELL in Papua was due to begin in January, according to the annual report of Oil Search, Ltd. The site is on the Vailala River, about 75 miles from the mouth, and the work is to be carried out by the Australasian Petroleum Co., Pty., Ltd., who have spent upwards of £700,000 on surveys and drilling equipment.

A SITE ON THE WEST COAST of the United States is to be selected by the Union Carbide Co. and the Electro Metallurgical Co. (units of the Union Carbide and Carbon Corporation) for the immediate erection of a combined carbide and ferro-alloy plant. The manufacture of calcium carbide along with ferro-silicon, ferro-manganese, and ferro-chrome alloys is envisaged.

ACCORDING TO THE BUREAU OF MINES, U.S. Department of the Interior, domestic output of mercury amounted to 3700 flasks in December last, compared with 3400 flasks in November. The previous high level for recent years was 3600 flasks in September and November. The consumption, however, fell from 2900 flasks in November to 2100 in December. Exports totalled 566 flasks, of which 373 went to the U.K.

ALL THE CIDER APPLES in Normandy and part of Brittany, states a French correspondent of *The Times*, have been removed by the Germans for the manufacture of "a certain war product." We have already recorded the use of apples by the Germans for paper making; no doubt they are capable also of utilising apple cellulose for explosive manufacture and malic acid for relieving sore throats.

THE PROBLEM OF DISPOSING of the by-products and waste products of the citrus fruit industry is dealt with in Circular No. 577 of the U.S. Department of Agriculture. The volatile oils in the peel are used as flavours and perfumes; no useful purpose has yet been found for the glycosides in the pulp (hesperidin in oranges, lemons, and tangerines; narangin in grapefruit); some attempt has been made to utilise the volatile oil from the seeds (mainly glycerides of fatty acids) by drying and pressing; and the waste from canning plants has served as a cattle-feed and as a humus-producing fertiliser.

Forthcoming Events

A JOINT MEETING OF THE SOUTH YORKSHIRE SECTION, Institute of Chemistry, and the Yorkshire Section, Society of Chemical Industry, will be held on March 25, at 6.30 p.m., at the Technical College, Rotherham. Mr. A. W. Chapman, D.Sc., F.I.C., will lecture on "Some Aspects of Boiler Water Treatment."

AT A MEETING at the Royal Society of Arts, John Adam Street, Adelphi, London, on March 26, at 1.45 p.m., the Aldred Lecture on "Discovery and Invention" will be delivered by Sir Richard Gregory, Bart., F.R.S.

A MEETING of the Electrodepositors' Technical Society will be held at the Northampton Polytechnic, St. John Street, Clerkenwell, London, E.C.1, on March 31, 1941, at 3.30 p.m. The following papers will be presented: "B.N.F. Jet Test for Determining the Thickness of Silver Coatings," by Mr. R. A. F. Hammond, and "Research in Progress at the National Bureau of Standards," by Dr. Wm. Blum. The chair will be taken by the President, Dr. H. J. T. Ellingham.

THE NINETEENTH ANNUAL CORPORATE MEETING of the Institution of Chemical Engineers will be held in the Connaught Rooms, Great Queen Street, London, W.C.2, on April 4. The business session (Corporate Members only), for the election of officers, etc., will start at 11 a.m., and will be followed by the President's address on "Some Post-War Problems" at 11.45. At the luncheon (12.45 p.m.) the principal speaker will be the Rt. Hon. A. V. Alexander, M.P., First Lord of the Admiralty.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

KENNETH HILL & CO., LTD., Letchworth, manufacturers of metallic abrasives. (M., 22/3/41.) February 24, £572 debenture to Diamond Blower Co., Ltd.; general charge *Nil, December 31, 1939.

County Court Judgments

ROTHWELL, HAROLD S., No. 2 flat, Overdale, Middleton Road, Crumpsall, works chemist (C.C.J., 22/3/41.), £60 1s. 6d. December 10.

BAKER'S PAINT STORES, LTD., registered office, 1, Kenton Park Parade, Kenton Road, Kenton, paint manufacturers (C.C.J., 22/3/41.), £20 10s. 8d. November 13.

Company News

British Tar Products, Ltd., have declared an interim dividend of 4 per cent. actual, less tax (4½ per cent.).

Mamaco Manufacturing Co., Ltd., manufacturers of and dealers in chemicals, etc., 25, Cheapside, E.C.2., changed its name to Slip Laboratories, Ltd., on February 21.

Pomilio Corporation, Ltd., 9, Anselm Road, Hatch End, Middlesex, changed its name to Cellulose Development Corporation, Ltd., on February 28.

Doudney and Co., Ltd., soap makers, etc., Unilever House, E.C.4., changed its name to Atkinson and Erasmic, Ltd., on February 26.

The Eaglescliffe Chemical Co., Ltd., announces a 6 per cent. dividend on 6 per cent. cumulative preference shares for the half year to March 31.

Thos. Firth and John Brown, Ltd., report profit of £619,647 of 1940. There will be a final ordinary dividend of 6½ per cent., making 12½ per cent. for the year, free of tax, as against 17½ per cent. for 1939.

John H. Robson & Company (Manufacturing Chemists), Ltd. have increased their nominal capital beyond the registered capital of £5000, by the addition of £20,000 in £1 ordinary shares.

The Millom and Askam Hematite Iron Co., Ltd., announce a profit for 1940, after providing £105,634 (£30,399) for taxation of £105,858 (£122,393), and have declared a dividend of 10 per cent. on ordinary (same).

Doulton and Co., Ltd., announce a net profit for 1940 of £31,424 (£61,079); add reserve for tax not now required, £3,475. Dividend 5 per cent. for the year (same); forward, £68,832 (£77,586). Meeting, Doulton House, London, S.E.1., March 27.

Vickers, Ltd., steel manufacturers, are paying a dividend of 10 per cent. on the ordinary capital for the fifth successive year. As an interim payment of 4 per cent. has already been paid, the final payment on April 1 will be 6 per cent. Net profits for 1940 were £1,119,120, compared with £1,192,041.

The bulk of the holding of **Courtaulds, Ltd.,** in the **American Viscose Corporation**—448,000 shares, representing 95 per cent. of the issued capital—have been sold on behalf of the British Treasury to a syndicate of American investment bankers. The purchase price to be paid to the Treasury is 90 per cent. of the proceeds of a public issue which it is proposed to make shortly in the United States. The Viscose Corporation is America's largest rayon producer.

Chemical Trade Inquiries

Iran.—An agent established at Tehran wishes to obtain the representation of United Kingdom manufacturers of Pharmaceutical products, cosmetics, toilet preparations, inks, etc. (Ref. No. 125).

Egypt.—The Minister of Public Health, Cairo, is calling for tenders for the supply and delivery of disinfectants for medical and general purposes during 1941-1942. Tenders should be addressed to the Director of Stores, Ministry of Public Health, Cairo, by whom they will be received up to 11 a.m. on May 21, 1941. Local representation is essential. Specimen copies of the specifications and general conditions of tender are available for immediate loan from the Department of Overseas Trade, Millbank, London, S.W.1. (WHitehall 9040, Ex. 636). (Ref. No. T. 16291/41).

New Companies Registered

P. H. Products, Ltd. (365,744). Private company. Capital £500 in 500 shares of £1 each. Manufacturers of and dealers in patent medicines and foods, chemicals, drugs, gypsum, disinfectants, fertilisers, oils, colours, etc. Directors: Ladislas L. Boutha, 6, Hertford Street, W.1., Fdk. E. Hatfield.

Sonbro Products, Ltd. (365,928). Private company. Capital £200 in 200 shares of £1 each. Manufacturers of and dealers in chemical preparations, essences, perfumes, oils, etc. Directors: Thos. W. Cole, John H. Robson, Harry Hamilton, Cecil J. H. Perrett. Registered Office: 215, High Street, Hounslow, Middlesex.

Genatosan Laboratories (Eastern), Ltd. (365,681). Private company. Capital £25,000 in 25,000 shares of £1 each (5000 "a" and 20,000 "b"). Manufacturers of and dealers in pharmaceutical products, foods and medicines, etc. Directors: Frank G. C. Fison, Albert G. Barthel, Joshua Green, and Walter G. T. Packard. Solicitors: Linklaters & Paines, 2, Bond Court, E.C.4.

Chemical and Allied Stocks and Shares

ALTHOUGH the general undertone of the stock and share markets was assisted by President Roosevelt's speech regarding aid for Britain, there was little or no improvement in activity. Business continued to centre on Government securities, the main tendency in other sections again being to await the Budget and developments in connection with the concentration of resources on essential war work. Among industrial shares those of companies doing important war work were relatively steady, but elsewhere values were slightly lower on balance, although very little selling was in evidence.

Imperial Chemical rallied following an earlier small reaction, and at 29s 6d. were virtually the same as a week ago, awaiting the preliminary figures for the past year's working. Courtaulds were marked up to 30s. 7½d., on news of the sale of the shares of the company's American subsidiary. The market is assuming that the American interests of other leading British companies will also be concerned with similar developments for increasing the dollar resources of the British Government. Borax Consolidated deferred units at 27s. have been well maintained on balance, and Turner & Newall were steady at close on 67s. B. Laporte remained around 58s. 9d., and Fison Packard were 32s. 6d., while business at 5s. 9d. was recorded in Greeff-Chemicals Holdings 5s. units, and British Drug Houses continued to transfer around 23s. At 50s. xd. Associated Cement were substantially lower on the reduced payment for the past year, while other cement shares failed to keep the prices ruling a week ago, and British Plaster Board 5s. ordinary reacted a few pence to 12s. 7½d. British Aluminium were 39s. xd., although the dividend was in accordance with most estimates. There was a fair amount of activity in British Oxygen, which, however, were 63s. 1½d., compared with 65s. a week ago, although the prevailing market view is that the dividend may be little changed, despite the larger capital now ranking. General Refractories had an easier appearance at 8s. 4½d., but Dunlop Rubber became firmer at 33s., and Lever and Unilever were fairly steady around 22s. 6d., while Imperial Smelting were 11s. British Oil & Cake Mills preferred ordinary were lower at 36s. compared with 37s. a week ago, but are now "ex" the dividend, which maintains the total payment for the past year at 12½ per cent. The lower dividend of Thos. Firth & John Brown induced an easier tendency in iron and steel securities, but declines were moderate and did not exceed a few pence; Stewarts & Lloyds were 42s. 3d., and Tube Investments 89s. 9d., while United Steel were 20s., and Staveley 15s. 9d. In other directions, Distillers ordinary units were lower at 61s., but United Molasses showed a firmer tendency around 22s. 9d. Nairn & Greenwich remained at the reduced price of 52s. 6d. made last week, and Barry & Staines were 26s., compared with 26s. 6d. Wall Paper Manufacturers deferred units kept at 19s. 6d., and Goodlass Wall 10s. ordinary were again around par. Moreover, Pinchin Johnson were maintained at 18s. 6d., and, allowing for the deduction of the dividend, International Paint at 80s. were virtually unchanged on balance. Pending the dividend announcement, Blythe Colour Works 4s. shares were quoted at 6s. 6d.

Boots Drug 5s. ordinary were 34s. 6d. and Southalls (Birmingham) 5s. units changed hands around 24s. Sangers were 16s. 6d. and Timothy Whites 5s. shares at 18s. were slightly lower as compared with a week ago. Among smaller priced shares, British Glues 4s. ordinary remained firmly held and were quoted at 6s. 3d.; British Industrial Plastics 2s. shares showed business at 2s. 3d. Cellon 5s. ordinary were quoted at 12s. 6d., and Lawes Chemical were 7s. 6d. Elsewhere, awaiting the dividend announcements, British Tyre and Rubber were 41s. 3d., and United Glass Bottle were close on 50s. Among other securities, Triplex Glass 10s. units had a steady appearance around 18s. 3d., and British Match were maintained at 29s. 9d. "Shell" and other leading oil shares reflected the general market trend and were slightly lower as compared with a week ago.